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UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Summary Review of Monthly Reports*
for
SOIL CONSERVATION SERVICE RESEARCH**

MAY 1947

EROSION CONTROL PRACTICES DIVISION

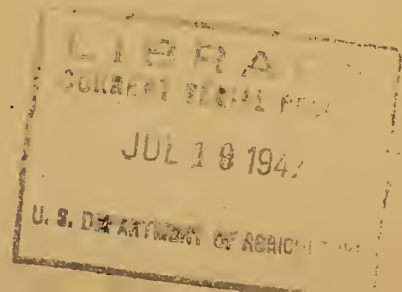
Cover Crops for Erosion Control - C. J. Whitfield, Amarillo, Texas.-

"Wheat, grain sorghum, and grass are being grown in different cropping systems on the station to evaluate their effectiveness in wind erosion control in the agriculture of the High Plains area. Grass is recognized as being the most effective means of stabilizing the soil against wind erosion. Wheat production, with crop residue management following the harvest of wheat, has prevented the soil from blowing following normal wheat crop years. Short sorghum stubble has not furnished adequate surface protection during the periods of high velocity winds, which occur between sorghum harvest in the fall and during the fallow period between harvest and fall seeding of wheat in a three-year cropping system of wheat, sorghum, and fallow. Different cultural practices and crop residue management methods are being tried in an effort to find a satisfactory method of producing grain sorghum on the High Plains without leaving the area in a vulnerable condition to wind erosion during the fallow period, occurring between sorghum harvest and wheat seeding time in the cropping system.

Crop Yields: "The average wheat yield in the wheat, sorghum, and fallow rotation during the past five years has been 18.1 bushels per acre in comparison to only 13.5 bushels per acre on continuous wheat, a difference of 4.6 bushels in favor of the rotation, an increase of 34 percent. The average sorghum yield in the rotation in which the grain was combined was 28.7 bushels per acre in comparison to 24.9 bushels on continuous sorghum, a difference of 3.8 bushels per acre, an increase of 15 percent in favor of the sorghum in the rotation."

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**All Research work of the Soil Conservation Service is in cooperation with the various State Experiment Stations.



Stubble Mulch Tillage -- Fallow vs. Continuous Wheat - C. J. Whitfield, Amarillo, Texas.-"The following table presents a comparison of the amount of tillage work involved with continuous wheat and that with wheat and fallow rotations, as recorded for the stubble mulch experimental plots. Average annual wheat yields are also included. Early fallow involves tillage for weed control from immediately after wheat harvest until wheat seeding time in the following year. In delayed fallow, tillage is not begun after harvest until early spring of the following year. With continuous wheat, tillage is begun immediately after harvest and continued as needed until fall seeding.

"These data show that surface management of residues with sub tillage yields more wheat than oneway disking. In addition, the average annual yields for continuous wheat are higher than those for wheat and fallow rotations. This, then, brings up the question of the amount of tillage involved and hence, operating costs in considering the economic practicability of fallowing as a farm practice.

Tillage Operations and Wheat Yields -- Wheat and Fallow vs. Continuous Wheat
Period 1942-1946, Inclusive

Rotation	Tillage Operation	Number of Operations							Wheat Seeding lb/Year	Ave. Annual Yield of Wheat Bu/A
		Tillage					Harvest lb/Year			
		1942	1943	1944	1945	1946		Ave.		
Wheat	Sweeps	3	2	4	3	2	2.7	0.5	0.5	9.6
and		1	3	2	4	3				
Early Fallow*	Oneway	2	1	4	3	3	2.5	0.5	0.5	8.2
		2	2	2	4	2				
Wheat	Sweeps	-	2	-	4	-	1.5	0.5	0.5	10.2
and		2	-	4	-	3				
Delayed Fallow*	Oneway	Not represented in this practice								
Contin-uous	Sweeps	2	2	2	3	2	2.2	1	1	11.0
Wheat*	Oneway	2	2	2	3	2	2.2	1	1	9.8

* Two sets of figures as shown for tillage operations in fallow rotations result from duplication of plots to provide both fallow and wheat each year for each rotation. The continuous wheat plots are in quadruplicate.

"A year of fallow in a 2-year rotation naturally results in only one-half the seeding and harvesting operations performed with continuous wheat cropping. While tillage operations with early fallow are only slightly greater than those with continuous wheat, the amount with delayed fallow is lower. This

lower cost of delayed fallow, along with the fact that average annual yields are higher than those from early fallow and only slightly lower than those from continuous cropping indicates that it has a definite value as a farm practice in the heavy soils of the Southern High Plains. Less tillage also means less damage to soil structure and better retention of residues on the soil surface.

"It is probable that, where it is desired to use a fallow practice, a combination of early and delayed fallow would give best results. In making a decision to perform or delay a particular tillage operation, attention would be given to moisture conditions and to the amount of volunteer growth. Top-soil moisture which would be lost by evaporation might well be put to use in growing a stand of volunteer wheat and weeds to be subtilled and left for surface protection.

"Further research work is needed to answer the questions remaining in connection with these practices in which conservation of both soil and water is involved."

Soil Organic Matter Increase in Connection with Crop Rotations -
B. H. Hendrickson, Watkinsville, Georgia.—"Soil samples to plow depth were collected from triplicate Station plots in March of 1943 and again in October of 1945. Analyses were made by Mr. O. W. Beale, under Dr. T. C. Peele's direction, at Clemson, S. C.

"The organic matter data for a 3-year rotation of oats-sown Kobe lespedeza, volunteer lespedeza and cotton are of particular interest. In Rotation No. 14 the oats and 1st year lespedeza were harvested for seed, the volunteer lespedeza for hay. In Rotation No. 15, oats and both lespedeza crops were harvested for seed, providing a heavier legume residue to be turned under for cotton.

"Both rotations resulted in small net increases in soil organic matter after 2-1/2 years, indicating that the gain due to the effects of the close-growing crops exceeded the loss due to one year of cotton cultivation. The best net gains averaged .23 percent organic matter. These were associated with the heavier stubble mulching. Taking a hay crop the 2nd year reduced the net gain by about one-half.

"The organic matter levels of the topsoils concerned in 1943 averaged 1.05 and 1.15 percent respectively. Both sets averaged 1.22 percent in 1945. Soil aggregation also increased accordingly by averages of 8.9 and 8.7 percent.

"Due to the manner in which some of the samples were taken, a clean-cut comparison developed this fact: with no turn-under of residues at all, despite one year of cotton cultivation, the roots and whatever organic infiltration occurred from the oats and lespedeza residues accumulating on the soil surface produced a small net increase in soil organic matter. And the more residue that accumulated on the surface, the more organic matter in the soil. The magnitude of these net gains were small, however, averaging .04 and 11 percent, respectively, over the 2-1/2 year period.

Soil Moisture Increased by Use of Rotary Subsoiler - Hugh C. McKay, St. Anthony, Idaho.-"In the field trials the use of the rotary subsoiler on stubble last fall showed an increase in moisture this spring over the area where no subsoiling was done. The percent moisture per foot is given in the following table.

<u>Depth in feet</u>	<u>Stubble land Rotary Subsoiler</u>	<u>Stubble land Check</u>	<u>Percent Difference</u>
1	20.7	16.8	3.9
2	18.3	18.0	0.3
3	18.4	17.4	1.0
4	17.3	16.7	0.6
5	13.8	12.9	0.9
6	13.2	11.2	2.0
		Total	8.7

8.7% moisture difference in 6 feet of soil is equal to 1.36 inches water.

"The results obtained this year were similar to last year as there was an increase in the amount of moisture resulting from subsoiling. However, the increase was not so great and the placement of the moisture in the soil was different.

"Last year the ground was not frozen and the greatest increases occurred in the 4th, 5th and 6th feet. This year the ground was frozen before much moisture was received and the greatest increase was found in the first foot. The ground did not thaw out fast enough to allow the moisture to penetrate to the subsoil.

"The difference in erosion was quite evident, there had been no runoff off of the subsoiled field while on the check field there was considerable runoff with some erosion."

Outside Work with SCS Technicians and Other Agricultural Workers - T. L. Copley, Raleigh, North Carolina.-"The educational type of work reported for March continued almost at the same pace during April. Eight field meetings were held away from the Station, with the following groups: District Technicians at Farmville, Virginia, with both inside meeting and a field demonstration; The Veterans Agricultural Class at South Hill, Virginia; A Farmers night meeting at Amelia, Virginia; Extension workers at Hillsboro, Epsom, and Reidsville, North Carolina; County Agricultural Board, Rockingham County, Wentworth, N. C., Wake County Agricultural Teachers at Raleigh.

"Four separate groups visited the Station during the month. These included, (1) Veteran's Agricultural Classes from LaCrosse, Virginia, and (2) Apex and (3) Knightdale, North Carolina, and (4) Soil Conservation Service technicians of the Neuse River District.

"The State Office in charge of veterans agricultural classes has passed out information to their various instructors that our Station may be visited by any of those interested. The prospects are now that we may be swamped by such visitors; however, this appears to be an excellent opportunity to pass on to a very important group of farm people the information which we have obtained during the past several years. We will attempt to take care of all groups who wish to visit the Station. This activity has already resulted in a noticeable increase in interest on tobacco land practices, and in addition to the tours over the Station, our project personnel is being called on for additional help with field demonstrations. Obviously, the Soil Conservation Districts in the tobacco section should take advantage of this increased interest."

Study Days on the Research Areas - G. W. Hood, Batesville, Arkansas.-

"The month was marked principally by study days and was one of the most successful ever held. On May 8, the Conservation class from Arkansas College numbering about 30 students, spent the day in studying the work. They observed the crops grown by the different methods and several hours were used to explain and discuss the work. On May 12, a bus load of Veterans numbering about 50, visited the station for the purpose of studying the conservation work, which was discussed and explained. On May 21, the 4H Club group consisting of 650 farm boys and girls spent the day studying the work of the station. This group was divided into sections and the conservation work carefully explained. On May 23, the Annual study day for farmers was held and attended by over 600 men and women. This group was also divided into sections and the conservation work was described and the results discussed. Many appropriate questions were asked indicating the exceptional interest the farmers have in the results of our experimental work here. The 24th of May was designated as Veterans day and we were swamped. Eleven hundred and fifty (1150) veterans from a number of counties in this section of the state visited the station to observe and study the work. This group was also divided into small sections and showed exceptional interest in our conservation of soil and water studies. The total number of visitors for the month was about 2500."

Tobacco Cover Crop Experiment - T. L. Copley, Raleigh, N. C.-

"The results of porosity measurements of surface soil samples from the cover crop plots are shown in the accompanying table, along with soil loss during the previous 6-month period, or while the cover crops were growing.

"The measurements were made on small core samples, by means of the Shaw Method, collected just before the cover crops were turned. Each value is an average of eight samples, four replicates from each plot in the two series.

"Three of these plots, the two weeds and the no-cover crop plots, had not been disturbed by cultivation since last July--a period of approximately 10 months. Assuming that the pores drained at 10 cms., tension would include the larger pores through which the soil matter could move quite freely, then these results tend to show that, excepting the red top sod, those plots that have been least disturbed by cultivation have a greater volume of the larger pores.

"If all of the non-capillary pores are drained at a tension of 60 cms., then the different winter cover crops and the two rotations have very little effect on the non-capillary porosity of the soil up to the time the cover is turned. The capillary pores not drained at a tension of 60 cms., are fairly constant for all treatments.

"A tabulation of soil loss from these cover crop plots for the six month period ending March 31, 1947, shows how little soil loss occurs during these fall and winter months, regardless of whether any cover was seeded or not. This will make an interesting contrast with the soil loss which will probably occur during the next six month period."

Winter Cover Crop or Crop in Rotation	Total Volume or Pores cc/100cc	Volume of Pores Drained at 10 cm. in 4 hrs. cc/100cc	Volume of Pores Drained at 10-60 cms. in 72 hrs. cc/100cc	Volume of Pores not Drained at 60 cms. cc/100cc	Soil Loss Oct. 1 to Apr. 1 Tons/A	Surface Con- dition at Time of Sampling.
No Cover (Check)	46.0	11.7	17.1	17.3	.02	Tobacco Stubble and crab grass.
Rye	45.7	8.0	20.9	16.9	.01	Good cover.
Rye-Nitrate	47.2	7.8	21.6	17.7	.00	Very good cover.
Ryegrass	46.8	7.9	20.7	18.2	.02	Good cover.
Ryegrass-Nitrate	44.4	7.3	18.8	18.4	.00	Very good cover.
Tobacco-Weeds	47.8	10.2	20.9	16.8	.03	Tobacco stubble and some crab grass.
Weeds-Tobacco	46.8	10.3	19.2	17.3	.00	Good cover of native weeds and grasses.
Tobacco-Red Top	46.3	6.7	23.1	16.6	.07	Fair cover of newly seeded red top.
Red Top-Tobacco	42.4	7.4	17.4	17.6	.01	Excellent cover of red top sod.

Note 1. Average values from Series I and II. (Sampled 4-7-47)

Note 2. Rainfall for the 6-month period was 14.76 inches.

Grazing Studies - C. J. Whitfield, Amarillo, Texas - "Continued high gains were made by all test groups through May. Steers on crested wheat were again tops with 3.02 pounds per day, followed by the seeded grass mixture with 2.63. The western wheat grass showed the smallest per day gain with 2.27 pounds per day; however, this is considered an excellent gain. As shown in the following table, the average weight of steers on crested wheat is greater than any of the other groups.

Lot No.	Pasture No.	Vegetation	Average Weight	Ave. Daily Gain
1	I-4	Crested wheat	740	3.02
2	F-2	Western wheat	683.5	2.27
3	I-2E	Seed mixture	725.0	2.63
4	H	Native and seeded	717.8	2.61
10	H	Native and seeded	723.5	2.63

"It is of interest to note that Lot 10, wintered on grass and 2 pounds of cake daily, made less gain during April than steers with 1 pound of cake on grass and poor wheat."

Continuous Grazing Versus Rotation Grazing of Pastures - O. K. Barnes, Laramie, Wyoming - "These pastures are on short grass range, consisting of about 90 percent blue grama and buffalo grass. Pasture 2 is the check and is grazed continuously from May 15 to September 15. Pastures 1, 3, and 4 are rotated. From May 15 to about July 15 they are grazed for one week periods and moved; this usually means a total of three weeks grazing for each of the three pastures. From the middle of July on they are grazed for a period of about three weeks each until around September 15.

"In 1945 and 1946 the stocking rate per acre was about 30 percent heavier on the rotated pastures as compared to the continuously grazed check pasture. Utilization studies show approximately equal degree of forage use for both methods of grazing, indicating greater regrowth during the early summer on the rotated pastures.

"Detail density and composition studies have been made on these pastures to determine the long time effect of these two systems of grazing on the cover.

Table I.-1946 Grazing Results

	Sheep Days Per Acre	Lbs. Gain Ewes	Per Head Lambs	Lbs. Gain Ewes	Per Acre Lambs
Check Pasture No. 2 Continuous Grazing	36.7	15.0	39.6	6.2	16.5
Pastures No. 1, 3, 4 Rotation Grazing	51.3	15.0	37.8	8.7	22.1

Table II.-Lbs. Vegetation Left at End 1946 Grazing Season.

	Lbs. Per Acre Short Grass	Lbs. Per Acre Mid Grass	Lbs. Per Acre Weeds	Total
Check Pasture No. 2 Continuous Grazing	157.9	18.0	3.2	179.1
Pastures No. 1, 3, 4 Rotation Grazing	151.2	21.5	5.9	178.6

Table III.-Leaf Height Measurements at End 1946 Grazing Season

	Ave. Leaf Ht. Short Grass	Ave. Leaf Ht. Western Wheat Grazed - Non Grazed Plants	Ave. % Utili- sation W. Wh.
Check Pasture No. 2 Continuous Grazing	.68 in.	2.23 in. 4.18 in.	38.6 %
Pastures No. 1, 3, 4 Rotation Grazing	.68 in.	1.93 4.11	27.8 %

Durability of Soil Aggregation Under Cultivation - C. S. Slater, College Park, Maryland.-"For some time we have wanted to know how long the aggregation of virgin surface soils lasts under cultivated conditions. Recently we obtained the following data.

<u>Soil type</u>	<u>Vegetation</u>	<u>Years in cultivation</u>	<u>Water Stability</u> %
Manor loam, Maryland	forest	0	94
" " "	garden	2	67
Chalfont silt loam, Penna.	forest	0	94
" " " "	garden	1	58
" " " "	garden	20	18

Strong Correlation Between Earthworm Population and Stability of the Soil Aggregates - "Aggregate studies are being made on samples of soil from Maryland, West Virginia, Ohio, Michigan, and Wisconsin, in connection with Henry Hopp's studies of the effects of earthworms on soils. Although not complete, the results bear out previous findings that a strong correlation exists between earthworm populations and the stability of the soil aggregates."

Discing Versus Plowing For Seeding Alfalfa - Brome Mixture - D. D. Smith, Columbia, Missouri.-"The first cutting of alfalfa-brome on the disked strip in the Clay County field test slightly outyielded that on the plowed strips. The heavily fertilized strips yielded 20 to 30 percent more than the check strip with the ordinary rate of fertilizer application. Seeding of alfalfa was in the fall of 1945.

Shatter and Deep Treatments Increased Both Size Root Ratio of Sweet Clover Plants - "The sweet clover plants that were plowed under before corn on the shattered and treated plots were materially larger in both root and top growth than those on the shattered plots without deep treatment. A larger percent of the total plant was in root growth on the shattered and treated plots than on the other plots. The stands did not appear to differ materially. Average weight of the sample plants is as follows:

Treatment	Oven-dry weight per plant		
	Top	Roots	Roots
	Grams	Grams	%
Check	2.85	1.95	40.7
Shattered	3.07	2.01	39.6
Shattered & deep treated	3.66	2.92	44.4

Operations Interest in Raindrop Research Results - Russell Woodburn, State College, Mississippi.-"Mr. C. E. Anders, State Conservationist for Mississippi, expressed a great deal of interest in our raindrop energy research and felt that information on this work could be used by Operations in the state.

"It appeared that splash data secured in the state would be of especial value for use in the districts in the Delta where splash rather than runoff erosion may be the key problem.

"Arrangements were, therefore, made for Mr. Busch, the Regional Photographer, to visit the project and secure pictures of the raindrop apparatus in action. Mr. Busch came on May 19 and the greater part of a day was spent in setting up special studies on the small rain applicator for his use. It is believed that some splendid photographs were made which should result in some valuable slides for Mr. Anders' use."

Frequency and Duration of Periods of Rainfall Deficiency During the Growing Season - O. R. Neal, New Brunswick, New Jersey.-"In connection with our work on supplemental irrigation we have tabulated periods of apparent deficiency of rainfall during the growing season for the past 9 years. The limits for such periods were set arbitrarily at 10 or more days with less than 0.25 inch of rain. One exception to these limits is the 41-day period in 1939 when .40 inch of rain fell. As yet we do not have a factual basis for these limits. However, observations have indicated that under average local soil conditions with a growing crop, soil moisture becomes limited during such periods. The beginning dates, number of elapsed days, and amount of rainfall for each period are shown in the tabulation on the following page.

"These records appear to indicate that supplemental irrigation would have been of benefit at some period during each of these growing seasons. In 1946, for example, irrigation of potatoes during the July 3 to July 20 period brought an 11 percent increase in yield. This occurred notwithstanding the fact that total rainfall for July was more than 2 inches above normal for the month."

Periods of limited rainfall during the growing season, Marlboro, New Jersey.

Beginning date	No. of days	Inches rainfall during period
<u>1938</u>		
April 21	18	.04
June 29	12	.13
August 13	15	.08
September 2	11	.02
<u>1939</u>		
April 30	41	.40
July 2	12	.12
September 10	18	.12
<u>1940</u>		
July 14	24	.20
September 10	16	.05
<u>1941</u>		
April 8	16	0
April 25	14	.23
May 11	12	.22
June 18	13	.06
August 2	10	.12
August 28	36	0
<u>1942</u>		
April 11	27	0
May 23	15	.21
June 15	12	.19
August 24	16	.08
<u>1943</u>		
April 23	19	.17
July 15	20	.11
August 11	16	.16
August 28	10	0
<u>1944</u>		
May 16	16	.12
June 25	38	.30
August 4	28	.24
September 15	18	.22
<u>1945</u>		
August 8	15	.24
August 26	15	.07
<u>1946</u>		
April 9	15	.13
June 15	13	.07
July 3	17	0
July 23	14	.09
September 3	17	0

Effect of Seedbed Tillage Methods on Soil Moisture in Wheat Land -
Carl L. Englehorn, Fargo, North Dakota.-"The percent of soil moisture to a depth of four feet as it may be affected by the type of tillage and in seedbed preparation at Langdon was determined during the latter part of May, with the results included in the following table:

Percent of soil moisture as affected by the method of tillage used
in seedbed preparation, May 21, 1947, Langdon. .

Tillage	Percent of soil moisture				
	0-6"	6-12"	12-24"	24-36"	36-48"
Stubble mulch, fall	33.3	27.9	23.6	23.7	24.3
Oneway disk, fall	32.7	26.2	24.0	25.0	25.3
Plow, spring	31.5	28.8	24.8	23.4	22.4
Field cultivator	30.7	26.8	23.2	19.7	19.9
Plow, fall	29.2	27.4	23.7	22.4	22.0

"As during previous seasons, variations in percent of soil moisture between tillage method are not great. Apparent, however, are a few tendencies. In the surface six inches of soil the moisture content is highest under fall stubble mulch tillage, especially as compared with fall plowing. At all depths the soil moisture under stubble mulch tillage compares favorably with that under fall plowing. In the second six-inch depth and the second foot more moisture was found under spring plowing than other tillage. This may be due to the greater degree to which snow was collected by the standing wheat stubble during the winter.

"On May 23 the soil was still frozen below a depth of two feet on the summer fallow plot series. Consequently it was too difficult to obtain soil samples for moisture determination."

Effect of Stubble-Mulch on Soil Temperature and Its Possible Relation to Wheat Yield - "Thermocouples were installed at several soil depths at three locations each on . plowed plots and on stubble mulch tilled plots at Langdon during the latter part of May in order to determine the extent to which the stubble mulch will affect soil temperature. It appears that soil temperature may be, either directly or indirectly, an important factor in plant growth especially during the early portion of the growing season and may be in part responsible for the 15 bushel average obtained from stubble mulch plots as compared with the 20 bushel yield obtained from plowing. Some of the preliminary temperature readings are given in the following table.

"The widest temperature difference between soils under the two tillage practices, naturally occurs nearest the surface; at noon the difference amounted to 10.7 degrees. The effect of the residue mulch, however, extends to a depth of 8 inches where at noon the difference was 1.5 degrees. With advance of day soil temperature gradually increased reaching a maximum at the surface at about noon but later at lower depths. The increase during the day was greater on the plowed than on the stubble mulch plots."

Temperature in degrees Fahrenheit of the surface soil as determined at several depths on plowed and on stubble-mulch tilled land and at intervals of one hour during the day, May 24, 1947, Langdon.

Time of Day	Soil temperature, degrees Fahrenheit							
	Plowing				Stubble mulch tillage			
	1"	3.5"	6"	8"	1"	3.5"	6"	8"
8 A. M.	48.8	45.7	45.7	45.5	46.5	44.9	44.6	44.6
9 A. M.	55.5	47.5	46.0	45.3	50.7	46.2	45.2	45.5
10 A. M.	60.7	49.7	46.3	47.6	54.3	47.8	45.3	45.0
11 A. M.	71.4	53.4	47.2	46.0	60.7	50.7	46.0	44.5
12 Noon	74.0	56.3	48.0	46.1	63.3	52.7	46.5	44.5
1 P. M.	72.5	60.5	50.2	47.3	63.2	55.1	48.7	45.8
2 P. M.	70.3	60.3	51.2	47.5	62.4	55.6	48.7	46.0
4 P. M.	72.0	60.5	52.3	48.4	63.1	55.8	49.9	46.6

Weeds and Summer Fallow - Hugh C. McKay, St. Anthony, Idaho. - "The weed problem on all of the plots is quite serious this year. During the 1946 fallow season no rain was received in sufficient quantities to sprout the weeds and volunteer wheat, consequently we did not get an opportunity to kill them before it was time to seed fall wheat. This resulted in a heavy growth of volunteer wheat plus the seeded wheat. The stand of wheat which resulted was too thick unless we receive considerable moisture this summer. The weeds are also making more of a growth than normally. The straw burned plots do not show the heavy wheat stand nor the weeds. The fire evidently killed the volunteer and weeds. Only occasionally do we get a year when we do not get a growth of volunteer wheat and weeds during the summer fallow season and an opportunity to kill them.

"It is encouraging to note the spread of stubble mulch fallow this year in this area. It was one of the most noticeable things in this dry farm area this year. Most of the fields have been inspected and they all are in very good condition."

Methods of Controlling Erosion, and of Bringing Eroded Land Back Into Production - Harley A. Daniel, Guthrie, Oklahoma. - "These problems have been studied over the past seventeen years at the Red Plains Conservation Experiment Station near Guthrie, Oklahoma. Since 1939, similar studies for the northwestern Oklahoma wheat area have been made at the Wheatland Conservation Experiment Station near Cherokee, Oklahoma. The results obtained to date at these two stations have been summarized in Oklahoma Agricultural Experiment Station Bulletin B-309, "Conservation and Land Use Investigations at the Red Plains Conservation Experiment Station, Guthrie, Oklahoma."

"The research findings at the Red Plains and Wheatland Conservation Stations are fundamental facts which help provide a basis for planning a coordinated soil conservation program for individual farms and ranches (Pages 5 and 6). Which of the research results will apply on a particular farm or ranch will depend upon the types of land included (Page 7).

"Some of the general conclusions to date include:

"The most effective method of controlling erosion and runoff is with thick-growing vegetation. Grass is the best type of vegetation for protective cover. Crop rotation, contour cultivation, and terraces also materially reduced runoff, thereby saving soil and moisture (Page 7).

"Crop yields were increased by such conservation and fertility maintenance practices as crop rotation (Page 10), winter cover crops and phosphate fertilizer (Page 12), and contour cultivation and terraces (Page 16 to 18). These beneficial effects did not always appear at once but began to show up after a few years (Pages 10 and 18).

"Pastures properly fertilized and managed yielded up to two or three times as much green feed of better quality than those not fertilized (Pages 21 and 24.)

"Vegetation was re-established on abandoned and badly gullied areas, and the land so treated at Guthrie had produced 40 to 63 pounds of beef annually during summer grazing periods (Pages 20 to 27). The density of the vegetation in treated gullies was over three times greater than the untreated (Page 23).

"Unused, shallow, rolling scrubby-oak land at Guthrie was successfully converted into pastures by removing woody vegetation, and the amount of beef obtained compared favorably with that produced on range land of the area (Pages 27 to 30). In fact the productive capacity of these pastures and meadows was increased about five times by this type of development and management (Page 28)."

Long-Time Benefits from Conservation - E. L. Sauer, Urbana, Illinois.-"Soil conservation does pay and the benefits of a conservation program increase from year to year. Ten-year records in McLean County show that farms with high conservation scores had lower net incomes per acre in 1936 than farms with low scores. For the five years, 1936-40, however, net incomes per acre averaged \$2.36 higher on the farms with high scores and for 1941-45 they averaged \$4.17 higher. For the entire period the high-score farms had an earned value of about \$60 per acre higher than the low-score farms. Increased yields on high-score farms relative to low-score farms was a major factor accounting for the difference in earnings. Similar benefits of conservation have been demonstrated in all other areas of the state.

Yields and Income on Identical High and Low Conservation Farms, McLean County,
1936-1945

Year	20 High Conservation Farms (Score 83) <u>a/</u> Col. 1	20 Low Conservation Farms (Score 59) <u>a/</u> Col. 2	Difference, Col. 1 Minus Col. 2
	Crop Yield Index <u>b/</u>		
1936	97	103	-6
5 yr. ave. 1936-40	101	98	3
5 yr. ave. 1941-45	103	96	7
1945	106	94	12
10 yr. ave. 1936-40	103	97	6
	Net Income Per Acre		
1936	\$5.78	\$6.54	\$-0.76
5 yr. ave. 1936-40	9.96	7.60	2.26
5 yr. ave. 1941-45	23.94	19.77	4.17
1945	27.51	22.64	4.87
10 yr. ave. 1936-40	17.54	14.08	3.46

a/ Conservation score as computed for the year 1945.

b/ Average yield of all crops on all farms equals 100.

DRAINAGE AND WATER CONTROL DIVISION

Hydrologic Studies - L. L. Harrold, North Appalachian Experimental Watershed, Coshocton, Ohio.-"Rain fell on 17 days and totaled 6.29 inches. There was only one period in this month when there were more than two consecutive rainless days. Consequently, the soil remained too wet for farm work. Corn planting has been delayed 1 month. On 3 days rain fell at high intensities - 1.80, 2.40, and 2.88 inches per hour, maximum 5-minute intensities on May 17, 21, and 25, respectively. Over 1 inch of rain fell on the latter 2 days. Runoff on three 8-acre watersheds for these 2 days is given below:

Date	Watershed No.	Runoff	
		Maximum	Total
		rate Inches per hour	Inches
May 21	1/192	0.16	0.13
	2/185	.04	.04
	3/187	.02	.09
May 25	192	.14	.19
	185	.05	.06
	187	.02	.17

1/All in winter wheat

2/Strip cropped - wheat and meadow

3/Strip cropped - corn and meadow. Corn strips plowed,
but not worked down.

"Runoff peaks and totals are greatest on wheat watershed 192. Peaks are least on corn-meadow strip watershed 187. Totals are least on wheat-meadow watershed 185. Apparently, the roughly plowed corn strips were more effective in reducing peak flow than the wheat strips. Seepage flow on watershed 187 contributed largely to the total runoff.

"Soil loss from the small wheat watersheds was greater on the one in poor practice and lesser on the one under conservation practices. Runoff on the latter was more than twice that on the former. Although runoff was greater, soil loss was less.

"Aggregate analysis of soil samples from the plowed and mulch plots reveal the fact that the surface of the mulched plots had a greater percentage of large aggregates than the plowed plots. This has carried over every year for 3 years after tillage. Data for 4 years are given below:"

Summary of data on aggregate analysis of Muskingum silt loam, mulch plots, sampled Sept. 27, 1946. (Expressed in percent)

Section	Soil depth: Inches	: Total aggregates: 8.-0.2mm		: Total fines: < 0.2mm		: Total parent materials: 8.-0.2mm	
		Plowed	Disked	Plowed	Disked	Plowed	Disked
E, F, G ^{1/}	0-1	34.0	49.2	40.1	26.2	26.0	24.6
	1-4	35.5	45.0	37.8	30.5	26.7	24.5
	4-7	33.6	37.5	40.2	38.8	26.2	23.7
H, J, K ^{2/}	0-1	37.8	48.4	35.7	25.2	26.4	26.1
	1-4	38.5	46.6	35.8	28.5	25.7	24.9
	4-7	43.9	40.3	31.4	35.1	24.7	24.7
L, M, N ^{3/}	0-1	35.8	46.0	33.7	22.8	30.4	31.2
	1-4	36.6	41.2	31.9	27.5	31.5	31.4
	4-7	39.2	38.0	28.4	30.7	32.5	31.3
O, P, Q ^{4/}	0-1	33.2	40.9	29.2	20.2	37.7	38.9
	1-4	36.6	41.3	27.6	20.4	35.8	38.4
	4-7	37.1	38.4	25.6	23.9	27.3	37.7

1/ Corn 1943, wheat 1944, meadow (1) 1945, meadow (2) 1946.

2/ Corn 1944, wheat 1945, meadow (1) 1946.

3/ Corn 1945, wheat 1946.

4/ Corn 1946.

Hydrologic Studies - J. A. Allis, Central Great Plains Experimental Watershed, Hastings, Nebraska. - "Last month mention was made of installing conservation practices on our 411-acre watershed and that a 100 percent cooperation was obtained from the 11 landowners and tenants on this area. Measurements of runoff from treated versus untreated large watersheds is information never before obtained in this region and will be especially valuable to SCS Operations, Flood Control Offices, and other agencies which have need for runoff data from agricultural areas.

"During May, Operations and Research personnel staked out the grassed waterways on the 411-acre watershed and discussed individual problems with each farmer. The waterways will be fallowed this summer in preparation for early grass seeding this fall and several fields will be planted on the contour. The cooperation of these farmers is gratifying and they are willing to do as much as they can as soon as possible--it would be quite a temptation for them to plant corn in the bottoms, especially in a year like this one with late seeding and prospective high prices. Terracing and land put back to pasture and other conservation practices will be put in as soon as practicable.

"On May 22 two pasture plots were grooved about 4 inches deep and 5 inches wide between the present pasture furrows. This will make the horizontal spacing about 4-1/2 feet apart instead of about 18 feet on one of the present plots and 14 feet apart on the other plot. Soil moisture samples show that the furrows concentrate the water and lateral dispersion is about 2-3 feet on each side of the furrow, hence the spacing of new grooves at about 4-1/2 feet apart were made. Information on pasture treatment is also needed in this region and this study along with the pasture renovation with the eccentric disk treated plots should be of a great deal of value to range and pasture management in this section of the country."

Hydrologic Studies - R. B. Hickok, Lafayette, Indiana.--"Total rainfall averaged 7.50 inches at the Throckmorton Farm, and slightly less at the Dairy Farm watersheds. This is approximately double the probable mean April rainfall for Lafayette. A total rainfall at the Throckmorton Farm of about 1.90 inches on April 29-30 produced the following total runoffs from experimental watersheds in rotation crops:

Total runoff from experimental watersheds, Purdue-Throckmorton Farm, Lafayette, Ind., April 29-30, 1947

Crop	Treatment	Wsd. No.	Total runoff, inches
Fallow*	Prevailing	5	0.88
		8	0.22
	Conservation	6	0.19
		7	None
Wheat	Prevailing	10	1.05
		15	0.24
	Conservation	18	0.45
		14	0.62
Meadow	Prevailing	4	0.19
		12	0.74
	Conservation	2	0.41
		11	0.42

*Corn stalks disced down in early winter, following direction of rows (contoured on conservation treated watersheds).

"It is interesting to note that water losses from wheat continued generally higher than from last year's corn watersheds on which stalks had been knocked down in early winter. The water losses were very low from the fallow conservation watersheds where heavy corn residues were laid down in the direction of the contoured rows.

"Permanent pasture watersheds produced runoff from continuous lateral seepage over long periods, with relatively high total water losses.

"Runoff samples were collected for six runoff periods from several watersheds, making a total of 32 aliquot samples for the month. Analyses are partially completed for these samples. In addition to the aliquot samples, a series of periodic samples were manually collected from two watersheds during the storm of April 29-30, for the study of variations in concentrations of total solids and comparison of the integrated total solid losses with those obtained from composite samples taken by the automatic aliquot samplers.

"Total solid losses for the April 29-30 storm are shown in the following table:

Total solid losses from experimental watersheds, Purdue-Throckmorton Farm, Lafayette, Ind., April 29-30, 1947

Crop	Treatment	Wsd. No.	Total solid loss, lbs./acre
Fallow*	Prevailing	5	563
		8	No sample (equip. failure)
	Conservation	6	52
		7	None
Wheat	Prevailing	10	214
		15	61
	Conservation	18	69
		14	67
Meadow	Prevailing	4	25
		12	27
	Conservation	2	37
		11	25

*Corn stalks disced down in early winter, following direction of rows (contoured on conservation treated watersheds).

"Although water losses were substantially lower from fallow land with corn stalks knocked down in early winter than from wheat land, the concentrations of total solids in runoff from the stalk land were sufficiently higher to make the total soil losses greater than from wheat."

Hydrologic Studies - R. G. White, East Lansing, Michigan.--"On April 19 and 20, watershed 'A' was plowed and seeded to oats. This area had been in corn in 1946, and protected during the winter months by a fall seeded rye winter cover crop. Watershed 'B' was plowed out of a 4-year old brome-alfalfa sod on April 20, and was permitted to lay rough throughout the entire month of May.

"During the month, there were five storms that produced runoff from the newly seeded oats, but there was no runoff from the plowed sod. The following table gives the runoff for the month:"

Date	Precipitation	Runoff, watershed 'A'		Runoff, watershed 'B'	
	Inches	(newly seeded oats)	Percent	(plowed sod)	Percent
May 1	1.24	0.1643	13.25	0	0
13	0.86	.5070	58.95	0	0
15	0.33	.0033	1.00	0	0
23	0.59	.0425	7.20	0	0
28	0.33	.0522	15.82	0	0
	5.91	0.7693	13.02	0	0

Hydrologic Studies - R. W. Baird, Laco, Texas.--"Computations for the rain of May 20 are completed for only four stations. The total amounts of runoff for these four stations were as follows: Area Y-2; 130 acres with conservation practices 0.559 inch runoff, 1.097 inches rainfall; Area 12, 3 acres native meadow 0.54 inch runoff, 1.310 inches rainfall; Area W-1, 170 acres ordinary practices, 0.461 inch runoff 1.012 inches rainfall; Area W-2, 0.461 inch runoff, 1.053 inches rainfall. In spite of the large amount of antecedent rainfall and relatively large amount of runoff, the small meadow area retained 0.77 inch of water or more than any other area. The rainfall differences were not as great for the larger areas but for this storm the area with conservation practices had slightly more runoff and less rainfall retained on the area than the areas with ordinary farm practices. These results are not unusual for storms occurring after the soil is wet.

"For the year 1946 the total amounts of runoff, rainfall, and the difference (the amount retained on the land) for two areas with conservation practices Y-2 (130 acres) and Y-4 (80 acres) and two areas with ordinary farm practices W-1 (170 acres) and W-2 (130 acres) were as follows:

Area	:	Rainfall	:	Runoff	:	Difference
Y-2		40.711		8.058		32.653
Y-4		40.768		7.307		33.461
W-1		39.644		8.574		31.070
W-2		39.778		10.259		29.519

"For the year the two areas with conservation practices had considerably less runoff and more water retained on the land than the areas with ordinary farm practices."

Hydrologic Studies - John Lamb, Jr., Ithaca, New York. - "Continued rains 21 days during the month, with an average total for all watersheds of 7.27 inches, caused almost continuous runoff. With the station 12-year monthly average of 4.60 and the annual accumulative of 15.01, we had a 2.67-inch monthly excess, and 1.93 inches excess for the 1947 accumulative. There were three peak runoff periods, previous to which the soil moisture on all areas was at field capacity. Pertinent data are as follows:"

Date :		#1 Idle	#2 Idle	#3 Idle	#4 Wood-	#5 Wood-
of :		land	land	land	land	land
storm:	Recording	18 acres	9 acres	9 acres	18 acres	9 acres
May	Total precipitation, inches	1.66	1.61	1.61	1.44	1.55
21	Total hours precipitation	5.83	5.83	5.83	5.83	5.83
and	Max. 15-min.inten. (in./hr.)	1.52	1.48	1.48	1.60	1.84
22	Peak runoff (inches/hour)	0.148	0.314	0.203	0.070	0.090
	Total precipitation, inches	0.64	0.83	0.83	1.11	1.19
May	Total hours precipitation	.50	.50	.50	0.50	0.50
25	Max. 15-min.inten. (in./hr.)	1.84	2.60	2.60	2.86	2.56
	Peak runoff (inches/hour)	0.135	0.585	0.521	0.085	0.017
	Total precipitation, inches	0.74	0.92	0.92	0.90	0.90
May	Total hours precipitation	1.83	2.50	2.50	2.50	2.50
29	Max. 15-min.inten. (in./hr.)	N.D.	1.36	1.36	0.80	1.12
	Peak runoff (inches/hour)	0.044	0.174	0.118	.013	0.027

Runoff Studies - V. D. Young, Fayetteville, Arkansas.-"A comparison of the storms for the month of May at Bentonville, together with those occurring June 1st, is shown in the table on page 22. From these data it will be noted that storms Nos. 1 and 2 occurring on May 15 produced the highest intensity rates for 5, 10, and 20 minute intervals. Runoff occurred from all watersheds during the period."

Runoff Studies - N. E. Minshall, Madison, Wisconsin.-"On May 15 and 16th, I made a field reconnaissance in Marathon County, Wisconsin, to locate possible sites for a 500-acre watershed for the establishment of runoff measuring station, and checked the installations at Lake Tomahawk during which another set of soil samples was collected for moisture determination,

"The report on Peak Rates of Runoff from the Fennimore Area was completed during the month and has been reviewed by the Illinois and Wisconsin Experiment Station Staffs."

Runoff Studies - T. W. Edminster, Blacksburg, Virginia.-"In accordance with telephone instructions from Mr. L. A. Jones, the Project Supervisor accompanied Mr. Holtan to Covington, Virginia, on the 13th to investigate potential seepage problems on the Falling Spring REA Power Development Project. Mr. C. H. Jennings of the Washington Office of the REA outlined the proposed project in which a pond, 1 acre in area and 6 feet in depth, is proposed at the stilling well above the penstock. At this point the sub-strata consists of travertine and loose marl deposits to a depth of approximately 120 feet. Mr. Holtan is carrying out extensive studies of the basic permeability in cooperation with Messrs. Walker and Turner and is also studying the possibilities of sealing the pond with various agents. These studies should be completed early in June and a report of the findings forwarded to the REA office.

"During the month of May seven sites were sampled and run in connection with permeability work. Mr. Turner completed these determinations and is preparing the necessary summary sheets for them. Four sites were on Moyock, two sites on a problem drainage bottom in Alleghany County and one site was carried out in cooperation with Mr. Holtan on the pond problem area. The 'quick sand' study was brought nearly to completion. Mr. Walker will return to the area in June to complete the installation, checking and adjustment of the probe tubes and sampling wells. Installation of draw-down equipment will also be undertaken."

Hydraulic Studies - F. W. Blaisdell, Minneapolis, Minnesota.-"Mr. Anderson tested the drop inlet spillway with the pipe conduit 100 diameters long laid on both 10 percent and 20 percent slopes. Data for the 10 percent slope were completely analyzed while analysis of the data for the 20 percent slope was largely completed. About 2 weeks' work remains to complete one phase of the study for which a progress report

PRECIPITATION FOR SELECTED TIME INTERVALS

BY DATES

STATION R-3 on W-III (Henderson)

1947

Storm date	5 min.		10 min.		20 min.		30 min.		Duration		Total prec. Ins.
	Amt.	Ins/hr.	Amt.	Ins/hr.	Amt.	Ins/hr.	Amt.	Ins/hr.	Hrs.	Min.	
May 1	.20	2.40	.39	2.34	.61	1.83	.72	1.44		70	.85
May 12	.10	1.20	.16	.96	.26	.78	.32	.64	5	24	1.32
May 15 No. 1	.38	4.56	.42	2.52	.42	1.26	.42	.84	1	48	.50
May 15 No. 2	.31	3.72	.52	3.12	.70	2.10	.75	1.50	5	34	1.31
May 16	.14	1.68	.24	1.44	.34	1.02	.42	.84	2	0	.86
May 20	.10	1.20	.18	1.08	.36	1.08	.49	.98	8	40	1.44
June 1 No. 1	.64	7.20	.78	4.68	.90	2.70	.97	1.94	6	28	2.70
June 1 No. 2	.43	5.16	.62	3.72	1.00	3.00	1.10	2.20	3	24	1.16

can be prepared. In view of the fact that many incorrect ideas now exist regarding the hydraulics of pipes laid on steep slopes, this proposed report should be of considerable value to SCS technicians as well as to others concerned with the problem involved.

"Mr. Donnelly devoted the month to submergence tests of the box inlet drop spillway, making 489 test runs on four different models.

Mr. Blaisdell devoted some time to a statistical study of the rating curves for box inlet drop spillways. Miss Gosslin computed the rating equation using the method of least squares to fit the curves in an effort to discover which of several basic equations gives the best fit. The analysis had not been completed at the end of the month.

"Mr. Blaisdell completed the editing of the progress report describing the results of tests of open channel transitions at high velocities and flat slopes. The report was reviewed by the project staff and by Dr. Straub and is now in the final stages of preparation. Five tests of transitions with the channel set on normal slopes were made and analyzed. No unexpected phenomena were observed."

Hydraulic Studies - D. D. Smith, McCredie, Missouri.--"Analysis of maximum rate of runoff data from the terrace studies on the discontinued Soil Conservation Experiment Station, Bethany, Missouri, has been continued during the month. Rate of runoff appears to be a function of terrace design (primarily grade) more so than percent of land slope. Rate of runoff for normal terraces on Shelby soil appears to be as follows:

<u>Frequency</u>	<u>Maximum rate of runoff Inches per hour</u>
10 year	3.10
5 year	2.50
2 year	1.73
1 year	1.13

"This runoff information along with the outlet design data from McCredie will be used to develop an outlet dimension table for the Shelby loam area."

Drainage Studies - M. H. Gallatin, Homestead, Florida.--"During this past period studies on nitrate losses were continued. Indications are that the heavier applications of Uramon 3/4 and one pound per tree will last and hold up longer than light applications. Cyanamid applied in February has held a fairly high level to this time. On one of

the grove areas the regular fertilizer application of 8 pounds of 4-5-7 was applied per tree on the 5-27, the area was sampled on the 5-26 and nitrates averaged between 37-80 PPM. On May 28 we had a 4.6 inch rain in two hours in this area. Sampling of this area on June 2 showed that probably all of the applied nitrogen was lost as the nitrates for this area ran from 19-22 PPM. It remains to be seen just what effect the heavy rain had on the organic portion of this fertilizer.

"The relative value of the various types of mulching materials remains about the same, that is, grass and pine straw are the best followed by shavings and natural cover about the same as the check area so far as moisture conservation.

"Data on this study for the period gives further indication that as the water table drops the surface layer dries out more rapidly and that to keep the trees growing the irrigation cycle must be shortened.

"Analysis of the chloride samples taken in the Miami area show that even in the Tamiami Canal area where no salt barrier is in operation the concentration of chlorides has not been as great as last year. In the Biscayne and Little River canal areas there is indicated a steady decline in concentration. Samples taken along the Goulds, Military, and North Canals shows that there has been an increase in contamination and concentration along these canals. At a point 1 mile west of the structure on the Military Canal the concentration in the surface soil on the 1-22-47 was 902 PPM against 17,092 PPM on the 5-20-47. This increase holds true proportionally for the other canals. The barriers on the Goulds and Military Canals have been completed with the exception that the flap gates have not been installed. The Highlands line was extended to the heavy mangrove this period. The heavy concentration of chlorides is found about nine miles south of Highlands between Sec. 23-26 T59R38E."

Drainage Studies - James Turnbull, Lake Alfred, Florida.-

"During May, the fruit from the experimental plots was picked. There was a considerable increase in the yield from the irrigated plots as compared with the yield from the unirrigated plots. The accompanying tabulation shows the yields by plots and the average yields.

"There are 59 trees per acre on the grove in which these plots are located, and on this basis, the average yields in boxes per acre, and the increase due to irrigation are:

Inches	<u>Valencia Orange</u>		<u>Marsh Grapefruit</u>	
	Yield	Increase by Irrigation	Yield	Increase by Irrigation
0	218.3	-	596.5	-
1-1/2	273.2	54.9	733.4	136.9
2-1/2	299.7	81.4	767.6	171.1
3-1/2	314.5	96.2	814.2	217.7

FRUIT YIELDS IN BOXES PER TREE, DR. SAMPLE ESTATE GROVE, HAINES CITY, FLA.
 IRRIGATION PLOTS 1946-47
 FRUIT HARVEST COMPLETED MAY 16, 1947

Irrigation Application	Oranges			Grapefruit		
	1st Series Plots	2nd Series Plots	Average*	1st Series Plots	2nd Series Plots	Average*
0	3.70	**	3.70	10.11	**	10.11
1-1/2	4.66	4.60	4.63	12.50	12.34	12.43
2-1/2	4.74	5.47	5.08	14.02	11.95	13.01
3-1/2	5.14	5.53	5.33	13.30	14.29	13.80

Note: The number of trees in the plots varies between 18 and 21. Averages shown are true averages for the number of trees included.

Statistical Analysis

Oranges

* The difference in yield between the 0" and 1-1/2" plots is highly significant:

Between the 1-1/2" & 2-1/2" plots is significant
 " the 2-1/2" & 3-1/2" " " not significant
 " the 1-1/2" & 3-1/2" " " highly "

Grapefruit

The difference in yield between the 0" and 1-1/2" is highly significant:

" 1-1/2" & 2-1/2" " not "
 " 2-1/2" & 3-1/2" " "
 " 1-1/2" & 3-1/2" " significant.

** Duplicate check plots have been set up this year but these plots were irrigated during part of the growing season of the fruit just harvested.

"The cost of irrigation averages about \$12.50 per acre per application at the present time, and three irrigation applications were made during the growing season of the fruit harvest reported herein. At \$1.25 per box on the tree for Valencia Oranges and \$.50 per box on the tree for Marsh Grapefruit, which are conservative estimates of this year's prices, it is obvious that irrigation this year was very profitable."

Drainage Studies - J. R. Carreker, Athens, Georgia.-"Total rainfall in May at the supplemental irrigation plots was 3.56 inches, while the normal rainfall for May is 3.55 inches. A rain of 0.77 inch on May 1 was followed by 18 successive days without precipitation. Then 0.65 inch fell on May 20 to break a definite drought period.

"Surface evaporation from the water pan during the 18-day period, May 2-19, inclusive, was 4.554 inches, and the total evaporation for the month was 5.167 inches.

"Corn was planted May 7 on all plots. A poor stand resulted from the dry soil. No irrigations were made, but one was needed to provide adequate germination for a good stand of the corn. A replanting of skips was made May 28.

"Okra and pole beans were planted May 12. A good stand was obtained after the May 20 rains. Tomatoes were transplanted to the plots May 23 with good soil moisture conditions.

"The pastures were stocked May 5 with 18 dairy type heifers of approximately 300 pounds average weight.

"Two inches of water was put on the 2-acre irrigated pasture May 8. The heifers were then divided 12 to the irrigated pasture and 6 to the unirrigated portion. A second irrigation was begun May 20 but rain began falling before the first setup run was completed. The pastures were still stocked 12:6 at the end of the month and the vegetation on the irrigated pasture from observation seemed in better condition than that in the unirrigated section.

"Approximately half of a 2-acre patch of first year alfalfa adjacent to a farm pond on the Southern Piedmont Conservation Experiment Station was irrigated on May 15. Alfalfa hay was cut April 28. Two inches of water was applied.

"Soil moisture samples taken May 16, 20 hours after irrigation showed:

<u>Soil depth</u> <u>inches</u>	<u>Irrigated area</u> <u>percent moisture</u>	<u>Unirrigated area</u> <u>percent moisture</u>
0-3	15.0	2.5
3-6	13.6	5.6
0-6	14.5	4.1

"A 1.70-inch rain fell 6 days after the irrigation. Fourteen days after irrigation, May 29, the alfalfa in the irrigated area was 16 inches high, beginning to bloom and nearly ready to be mowed again, while that in the unirrigated area was 8 inches high and just beginning to grow good."

Hydrology - W. D. Ellison, Washington, D. C.-A paper entitled "Soil Erosion Studies - Part II (Soil Detachment by Raindrop Splash" by W. D. Ellison was published in the May issue of "Agricultural Engineering," Journal of the Amer. Soc. of Agr. Engin.

Sedimentation Studies - L. C. Gottschalk, Washington, D. C.-"During the period May 6-8, C. B. Brown and I attended the Federal Inter-Agency River Basin Committee Sedimentation Conference at Denver, Colorado. A total of 218 representatives of various Federal agencies and other organizations attended the conference, the first of its kind ever held. C. B. Brown presented two papers entitled 'Perspective on Sedimentation' and 'How Effective are Soil Conservation Measures in Sedimentation Control?' In the first paper the general problem of sedimentation as it affects various enterprises was outlined. The second paper included a discussion of sediment-source areas in the United States and the effectiveness of conservation measures for controlling sediment production. I presented a paper entitled 'Analysis and Use of Reservoir Sedimentation Data,' which outlined the various methods of analysis used by the Soil Conservation Service and practical application of results.

"During the period May 12-13, I made an inspection of Guernsey Reservoir on the North Platte River at Guernsey, Wyoming, and cooperated with the Bureau of Reclamation in planning a sedimentation resurvey of this reservoir by supersonic methods. The original capacity of this \$2,300,000 reservoir when completed in 1927 was 67,570 acre-feet. A sedimentation survey made in 1946 showed a remaining capacity of 46,050 acre-feet, or a loss of storage equal to 32 percent of the original capacity. This reservoir supplies storage for irrigating 355,000 acres of land."

IRRIGATION DIVISION

Snowmobile for Snow Surveys - Willis C. Barrett, Logan, Utah.-

"The second model of snowmobile is within three or four weeks of completion. This model is believed to meet all the requirements of an over-snow transport vehicle for snow surveys. Besides overcoming many mechanical details that in other snowmobile, that make them unable to meet snow survey requirements, a fundamental principle in snow shear has been discovered that will make a great difference in the success or failure in any machine to meet the requirements imposed on it."

Water Supply Forecasts in Northwest - W. T. Frost, Medford, Oregon.-"Of the 51 forecasts made last year 32 have been verified as follows:

34 percent of the forecasts were Good
41 percent of the forecasts were Fair
25 percent of the forecasts were Poor

Average deviation of the forecasts was 14.4 percent."

Summary of Snow Surveying in Utah - Dean K. Fuhrman, Logan, Utah.-"A summary of snow surveying activities of the present fiscal year has been prepared during the month. This summary includes cost analysis as well as a resume of values of snow surveys in Utah. It is believed that this will be valuable as a reference. Summary of all of the snow measurements in Utah, since the beginning of the snow survey program in 1924, is under preparation. Such a record will be of great value in preserving the record of past years in a permanent form."

Water Supply Reports - Clyde E. Houston, Reno, Nevada.-"The acute water shortage forecast for Arizona in the March 15 snow survey report has materialized to the extreme. San Carlos Reservoir, with a capacity for 1 and 1/4 million acre feet of the upper Gila River was at zero available capacity as of May 14. Of the approximately 90,000 irrigable acres in this project only 20,000 are being irrigated and these from ground water. The above acreage is planted to cotton, all other acreage is dependent upon summer rainfall which seldom occurs prior to the middle of July. Reports from Salt River Valley along with personal interviews indicate that crop losses due to water shortage will amount to about 1/3 the planted acreage of about 1/2 million acres."

Homer J. Stockwell, Fort Collins, Colorado.-"The regular May 1 snow reports were published and mailed on May 9. The water supply outlook for the Colorado River tributaries improved about 10 percent during April. In Wyoming the water supply situation improved a similar amount. On the east slope of the Continental Divide north of Denver the discharge of the streams will be near the maximum of the past ten years. The Arkansas River will flow at least 50 percent above last year and 25 percent above normal. The flow of the Rio Grande in Colorado will be

about 50 percent better than last year but 75 percent of normal. The San Juan will flow 50-60 percent of normal at the New Mexico line. There has been considerable snow and rain since May 1."

Erosion on Irrigated Slopes - Wayne D. Griddle, Boise, Idaho. - "For Portneuf and Bancroft soils found in eastern Idaho, erosion from irrigation is not usually a serious problem on furrow slopes less than 2 percent. At the lower slopes, furrow streams two or three times that needed to satisfy the intake rate causes but little additional erosion. However, a stream slightly too large on the steeper slopes may do irreparable damage."

Study of Utah Drainage Districts - J. Howard Maughan, Logan, Utah. - "A study of drainage districts in Utah scheduled for completion about the end of 1947, reveals that of 38 organized districts set up since 1915 to drain about 200,000 acres of farm land, only 20 districts can be classed as successfully operating at the present time. These functioning districts serve a little less than 100,000 acres, or about 50 percent of the land included in the 38 original districts.

Much of the unsuccessfully drained land within districts was heavy lowland soils, often containing considerable alkali, and had never been in cultivation. In many cases the problems of drainage and of tillage in these areas wrecked the districts.

Aside from the physical problems of draining the land there were troublesome financial and institutional problems that were encountered by most districts. Boards of Supervisors consisting of farmers without special training in drainage matters found themselves dealing with the technical problems of finance, taxation, legal requirements and litigation, together with engineering problems of drainage construction and maintenance.

In many of the small drainage districts the lack of regular technical guidance on matters of finance, engineering and legal aspects, resulted in the accumulation of problems that ultimately brought many of the districts to failure. The purpose of the Utah Drainage District Study is to analyze and report the problems and accomplishments of Utah drainage districts and to evaluate the district as a drainage institution in this state."

